

the existence of higher animals of a larger size than the hollow trees were capable of receiving. Nor does it exclude the possibility of higher animals having lived contemporaneously in upland situations remote from the low flats to which our knowledge of the coal formation is for the most part confined. It is to be observed also that as some of the reptilian animals are represented only by single specimens, there may have been still rarer forms, which may be disclosed should other productive trees be exposed by the gradual wasting of the cliff and reef."

II. "On the Variation of the Electric Conductivity of Glass with Temperature, Density, and Chemical Composition." By THOMAS GRAY, B.Sc., F.R.S.E. Communicated by Professor Sir WILLIAM THOMSON, F.R.S. Received December 28, 1881.

(Abstract.)

In this paper the results of the continuation of a series of experiments, some preliminary results of which were published in the "Phil. Mag." for October, 1880, are given. The experiments were performed in the Physical Laboratory of the Imperial College of Engineering, Tokio, Japan.

In the preliminary experiments it was found that the conductivity of glass increased with the temperature, following a similar law to that found to hold for other highly insulating substances. It was also found that the effect of successive heatings and coolings was to diminish the conductivity. Further experiments on this subject show that although the diminution of conductivity here referred to sometimes occurs, it does not always occur, and does not seem to do so when the glass is newly manufactured. Reference is made to preliminary experiments on the effect of time on the electric conductivity of glass, the results of which indicate an increase in conductivity with time.

The subject of the main part of the paper is an account of experiments on the relation between the electric conductivity of glass and its density and chemical composition. A large number of specimens of lime glass were examined, but, as was to be expected in this case, no marked connexion between electrical quality and density could be observed. It was found, however, on analysing a few specimens, that the composition of those which had a high conductivity differed considerably from that required to form an exact chemical compound, while those which had a low conductivity had a composition agreeing more or less closely with that required for a trisilicate of potash and lime, or a mixture of potash, lime, and soda-lime trisilicates.

A few specimens of lead or flint glass were examined in the same way, and in this case a very marked connexion between electric conductivity and density was observed. This result was, however, no doubt due to the fact that the density of this kind of glass gives an indication of its chemical composition. In all the specimens examined it was found that the higher the density the lower the conductivity. The highest density reached, however, was that in the case of a Thomson's electrometer jar, which had a density of 3.172. On examining these specimens for chemical composition it was found that the electrometer jar contained almost exactly the proper amount of lead and potash to form a trisilicate of potash and lead. It appears likely, therefore, that the electric conductivity of glass is lowest when it is an exact chemical compound. It will be interesting to learn from future experiments if still more dense glass has a higher conductivity, and if the conductivity passes a minimum at the point where the pure silicate is reached.

The author has to express his great obligation to his colleague, Dr. Edward Diver, in whose laboratory and under whose superintendence the chemical analyses of the specimens of glass were made.

III. "On a New Electrical Storage Battery. (Supplementary Note.)" By HENRY SUTTON. Communicated by THE PRESIDENT. Received January 3, 1882.

The new cell consists of a flat copper case, of the same shape as a Grove's cell; it has a lid of paraffined wood, from which hangs a plate of lead amalgamated with mercury, the lower part of the lead plate being held in a groove in a slip of paraffined wood resting on the bottom of the copper case: through the lid a hole is bored for the introduction of the solution, which consists of a solution of cupric sulphate, to which is added one-twelfth of hydric sulphate; the presence of this free sulphuric acid improves the cell at once.

The following sectional sketch shows the arrangement:—

